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NOTICE

As indicated in the Introduction to *Nuclear Science Abstracts*, Nos. 6B, 12B, 18B, and 24B normally consist of New Nuclear Data. Please note that New Nuclear Data, originally intended for separate issuance in No. 6B and No. 12B, will be combined and issued as New Nuclear Data, Volume 10, No. 12B, dated June 30, 1956.

It has been necessary to omit the Author Index and Numerical Index of Reports usually included in this issue. Cumulated indexes for Vol. 10, Nos. 1-12A, will appear in No. 12B, dated June 30, 1956.

BIOLOGY AND MEDICINE

3766 AEC-tr-2156

FLUORESCENCE AND PHOTOCHEMISTRY OF CHLOROPHYLL. Papers by A. A. Krasnovsky, V. B. Evstigneev, and Co-workers. 1948-1953. Translated by Eugene I. Rabinowitch. 22p. \$0.60(OTS).

RADIATION EFFECTS

3767 AECU-3139

Michigan Univ., Ann Arbor.

STUDY OF THE BIOLOGICAL EFFECTS OF IRRADIATION. Progress Report for Period of January 16, 1954 to January 15, 1955. Frank H. Bethell, Charles H. Altshuler, Burton L. Baker, David F. Bohr, Owen France, Henry J. Gomberg, Sylvester E. Gould, Jean Guy Laurin, James W. Linman, Richard L. Potter, James G. Van Dyke, and John B. Villella. 163p. Contract AT(11-1)-75. \$1.00(OTS).

3768 ORNL-2060

Oak Ridge National Lab., Tenn.

BIOLOGY DIVISION SEMI-ANNUAL PROGRESS REPORT FOR PERIOD ENDING FEBRUARY 15, 1956. Apr. 20, 1956. 67p. Contract W-7405-Eng-26. \$10.80(ph OTS); \$3.90(mf OTS).

3769 ORO-150

Tennessee. Univ., Knoxville.

AGRICULTURAL RESEARCH PROGRAM. Semi-Annual Progress Report for July 1, 1955 to December 31, 1955. May 1956. 129p. Contract AT-40-1-GEN-242. \$0.65(OTS).

3770 UCLA-363

California. Univ., Los Angeles. Atomic Energy Project. EFFECTS OF IRRADIATION *IN VIVO* ON BACTERIAL DEOXYRIBONUCLEIC ACID. Amos Norman, John W. Rowen, and Barbara Evans. Apr. 16, 1956. 15p. Contract AT-04-1-gen-12. \$3.30(ph OTS); \$2.40(mf OTS).

E. coli desoxyribonucleic acid given 10,000 r *in vivo* gave the identical ultraviolet absorption spectrum and exhibited the same flow birefringence behavior as DNA extracted from unirradiated cells. This was true whether the extraction was carried out immediately after irradiation or after a two hr incubation period at 37°C. DNA given 10,000 r *in vitro* exhibited little significant change in its length distribution, as seen in the extinction angle vs gradient curves, but its birefringence decreased to about half its original value. (auth)

3771 UR-440

Rochester, N. Y. Univ. Atomic Energy Project.

THE RELATIONSHIP BETWEEN SURFACE GRADE AND DEPTH OF DAMAGE OF BURNS PRODUCED BY RADIANT THERMAL ENERGY. J. R. Hinshaw, H. W. Bales, and

H. E. Pearse. Mar. 26, 1956. 11p. Contract W-7401-eng-49. \$3.30(ph OTS); \$2.40(mf OTS).

The relationship between surface grade and depth of injury of burns produced on bare porcine skin by radiant thermal energy has been investigated. Surface grades of 1+ and 2+ correlate well with depth of injury independently of exposure time, but a grade of 3+ does not, except for very short exposure times. The depth of 4+ burns, and of 3+ burns from long exposures, can be determined only by microscopic examination of the tissue. (auth)

RADIATION HAZARDS AND PROTECTION

3772 UCRL-3328

California. Univ., Berkeley. Radiation Lab.

MERCAPTOETHYLAMINE AND LIVER SHIELDING IN IRRADIATED RATS. STUDY OF ERYTHROPOIESIS WITH IRON-59. H. Maisin and Ray Wolfe. Mar. 7, 1956. 17p. Contract W-7405-eng-48. \$3.30(ph OTS); \$2.40(mf OTS).

RADIOTHERAPY

3773 ORO-125

Oak Ridge Inst. of Nuclear Studies, Inc., Tenn.

RADIOISOTOPES IN MEDICINE. Gould A. Andrews, Marshall Brucer, and Elizabeth B. Anderson, eds. Sept. 1953. 825p. \$5.50(GPO).

Lectures are presented which were given during a course on clinical uses of radioisotopes. Topics discussed include the availability of isotopes, problems in radiation, radiation measurement and dosimetry, tumor localization, diagnostic and therapeutic uses of radioiodine, metabolic and vascular studies, isotopes in the study and treatment of hematologic disorders, therapy with radioactive colloids, and therapy with external and implanted sources. 1785 references. (C.H.)

TOXICOLOGY STUDIES

3774 HW-38757

Hanford Atomic Products Operation, Richland, Wash.

BIOLOGICAL EFFECTS OF I^{131} CHRONICALLY ADMINISTERED TO SHEEP. L. K. Bustad, L. A. George, Jr., S. Marks, D. E. Warner, C. M. Barnes, K. F. Herde, and H. A. Kornberg. Dec. 27, 1955. 56p. Contract W-31-109-Eng-52. \$9.30(ph OTS); \$3.60(mf OTS).

3775 LA-1423

Los Alamos Scientific Lab., N. Mex.

RELATIVE ACUTE TOXICOLOGICAL EFFECTS OF URANIUM²³³ AND URANIUM²³⁸. John B. Storer, Phyllis Sanders, John Furchner, and Julia Wellnitz. June 3, 1952. Decl. Dec. 8, 1955. 37p. Contract W-7405-Eng-36. \$0.30(OTS).

TRACER APPLICATIONS

3776 UCLA-364

California. Univ., Los Angeles. Atomic Energy Project. INITIAL STUDIES OF BLOOD-BRAIN BARRIER DISTURBANCES WITH RADIOACTIVE TRACERS. B. Cassen, W. Gutfreund, and M. Moody. Apr. 16, 1956. 12p. Contract AT-04-1-GEN-12. \$1.80(ph OTS); \$1.80(mf OTS).

CHEMISTRY

3777 MLM-1052

Mound Lab., Miamisburg, Ohio. DIFFUSION OF SYNTHETIC AND NATURAL POLYPHOSPHATES. B. J. Katchman and H. E. Smith. June 10, 1955. 9p. Contract AT-33-1-Gen-53. \$1.80(ph OTS); \$1.80(mf OTS).

Diffusion constants for synthetic and yeast polyphosphates are reported. Yeast polyphosphates are classified according to solubility and chain length. Experimental results suggest a relationship between polyphosphate diffusion and cation association. (auth)

3778 AEC-tr-2411

THE PREPARATION OF CHEMICALLY PURE VANADIUM FROM THE GAS PHASE. G. Jantsch and F. Zemek. Translated by J. A. Hinkebein from *Monatsh. Chem.* **84**, 1119-26(1953). 9p.

An abstract of this paper appears in *Nuclear Science Abstracts* as NSA 8-4518.

Refer also to abstract 3766.

AEROSOLS

3779 KAPL-1463

Knolls Atomic Power Lab., Schenectady, N. Y. COLLECTION EFFICIENCY OF AIR CLEANING AND AIR SAMPLING FILTER MEDIA IN THE PARTICLE SIZE RANGE OF 0.005 TO 0.1 MICRON. J. J. Fitzgerald and C. G. Detwiler. Dec. 9, 1955. 51p. Contract W-31-109-Eng-52. \$7.80(ph OTS); \$3.30(mf OTS).

ANALYTICAL PROCEDURES

3780 HW-41713

Hanford Atomic Products Operation, Richland, Wash. THE DETERMINATION OF FLUORIDE IN HEAVY METAL AMMONIUM FLUORIDES: THE PATH OF AMMONIUM DURING PYROHYDROLYSIS. M. D. Alford. Mar. 1, 1956. 7p. Contract W-31-109-Eng-52. \$0.10(OTS).

Fluoride in heavy metal ammonium fluoride may be determined by combining F^- equivalent to NH_4^+ and F^- found by OH^- titration of the steam condensate from pyrohydrolysis. Pyrohydrolysis at 1000° quantitatively removes NH_4^+ . (auth)

3781 AEC-tr-2450

INFORMATION ON NITRIC ACID. X. GAS ANALYSIS METHODS IN THE SYSTEM N_2 -NO-NO₂-N₂O₄-N₂O₅-HNO₂-HNO₃. A. Klenenc. Translated by K. Bevis from *Monatsh. Chem.* **83**, 334-45(1952). 14p.

LABORATORIES AND EQUIPMENT

Refer to abstract 3796.

MOLECULAR STRUCTURE

3782 AEC-tr-2421

TOPOLOGY OF RECIPROCAL COMPLEX FORMATIONS IN TERNARY AND QUATERNARY SYSTEMS. A. G. Bergman and G. A. Bukhalova. Translated from *Izvest. Sektora Fiz. Khim. Anal. Inst. Obshchei Neorg. Khim. Akad. Nauk S.S.S.R.* **19**, 33-40(1949). 15p.

3783 AEC-tr-2422

ON THE CHARACTERISTIC PROPERTIES OF THE CHEMICAL DIAGRAMS OF THE STABLE ELEMENTS OF TERNARY AND QUATERNARY RECIPROCAL SYSTEMS. A. P. Palkin. Translated from *Izvest. Sektora Fiz. Khim. Anal. Inst. Obshchei Neorg. Khim. Akad. Nauk S.S.S.R.* **19**, 120-5(1949). 12p.

RADIATION CHEMISTRY

3784 ANL-5205

Argonne National Lab., Lemont, Ill. DECOMPOSITION OF WATER IN BORIC ACID-CADMIUM SULFATE SOLUTIONS BY REACTOR RADIATIONS. William R. McDonell. Jan. 11, 1954. Decl. Dec. 2, 1955. 19p. Contract W-31-109-eng-38. \$0.20(OTS).

The presence of $CdSO_4$ in H_3BO_3 solutions exposed to reactor radiations was shown to increase the amount of H_3BO_3 which such solutions may contain before H_2O decomposition begins. This is ascribed to an increase in the γ flux by neutron capture in the Cd, thus enhancing the recombination of the primary decomposition products of H_2O , H_2 , and H_2O_2 . In addition, $CdSO_4$ was shown to catalyze chemically the decomposition of H_2O_2 to O_2 , under both Co^{60} and reactor γ radiation. (auth)

RARE EARTHS AND RARE-EARTH COMPOUNDS

3785 BMI-261

Battelle Memorial Inst., Columbus, Ohio. DISTRIBUTION OF RARE-EARTH TRACERS BETWEEN AQUEOUS AND TRIBUTYL PHOSPHATE-DILUENT PHASES. Final Report. R. H. Blackmore, A. E. Bearse, and G. D. Calkins. June 20, 1952. Decl. Nov. 30, 1955. 25p. Contract AT-(30-1)-Gen-228. \$0.25(OTS).

The purification of $Th(NO_3)_4$ by solvent extraction of rare-earth impurities is discussed. Data are presented on the effect of several variables on the distribution of rare earths between aqueous and TBP-diluent phases. The distribution ratios (organic/aqueous) of the rare earths vary directly with tributyl phosphate (TBP) concentration of the organic phase and HNO_3 concentration, and inversely with Th concentration. (auth)

3786 NAA-SR-202

North American Aviation, Inc., Downey, Calif. AN EXPLANATION OF THE EFFECT OF ADDED METALS ON THE DISTRIBUTION OF RARE EARTHS BETWEEN LIQUID BISMUTH AND $KCl-LiCl$. D. Cubicciotti. Jan. 8, 1953. Decl. Nov. 9, 1955. 10p. Contract AT-11-GEN-8. \$0.15(OTS).

An explanation is proposed of experimental results obtained on the distribution of rare earths between liquid Bi and molten LiCl-KCl . It is shown that the mass-action law predictions of the distribution agree with experimental observations, if it is assumed that the equilibrium governing the distribution is the partial reduction of the LiCl by the rare earth metal. The distribution of the rare earth is affected by added metals inasmuch as they affect the equilibrium. (auth)

SEPARATION PROCEDURES

3787 BMI-JDS-202

Battelle Memorial Inst., Columbus, Ohio.

THE SEPARATION OF ZIRCONIUM AND HAFNIUM.

Final Report. James F. Shea, D. W. Scott, H. W. Adam, A. E. Austin, and C. M. Schwartz. June 30, 1949. Decl. Nov. 23, 1955. 36p. Contract AT-30-1-Gen-228. (Deleted version: AECD-2979). \$0.30(OTS).

Petrographic, x-ray, and analytical studies were made on synthetic and natural Zr minerals containing Hf. Optical properties of the silicates and oxides of Hf and Zr were also investigated. (C.W.H.)

3788 ISC-710

Ames Lab., Ames, Iowa.

SEMI-ANNUAL SUMMARY RESEARCH REPORT IN

ENGINEERING FOR JULY-DECEMBER 1955. Feb. 27, 1956. 22p. Contract W-7405-Eng-82. \$0.20(OTS).

Processing of monazite sands for Th and U recovery, separation of rare earths by solvent extraction, the extraction of U with molten metals, and the determination of the surface properties of La and Ce are reported. (J.E.D.)

3789 MLM-748

Mound Lab., Miamisburg, Ohio.

A SURVEY OF METHODS FOR EXTRACTING URANIUM FROM SLAG BY-PRODUCT OF ELEMENTAL PHOSPHORUS FURNACES AND FROM CHATTANOOGA SHALE. Information Report. C. S. Lowe. Sept. 2, 1952. Decl. Oct. 24, 1955. 15p. Contract AT-33-1-gen-53. \$0.20(OTS).

3790 TID-7508

National Lead Co., Inc. Raw Materials Development Lab., Winchester, Mass.

RAW MATERIALS CONFERENCE ON SOLVENT EXTRACTION, HELD AT WINCHESTER, MASSACHUSETTS, JANUARY 17-18, 1955. Arthur M. Ross, comp. Apr. 1, 1955. Decl. Dec. 15, 1955. 72p. \$0.40(OTS).

A conference was held for the purpose of discussing the application of solvent extraction to raw materials processing. The status of the respective programs of the participating laboratories is outlined. (J.E.D.)

3791 UCRL-3265

California. Univ., Berkeley. Radiation Lab.

SEPARATION OF THE LANTHANIDES BY ION EXCHANGE WITH ALPHA-HYDROXY ISOBUTYRIC ACID. G. R. Choppin and R. J. Silva. Jan. 20, 1956. 6p. Contract W-7405-eng-48. \$1.80(ph OTS); \$1.80(mf OTS).

3792 UCRL-3324

California. Univ., Berkeley. Radiation Lab.

ANION EXCHANGE SEPARATION OF MOLYBDENUM AND TECHNETIUM AND OF TUNGSTEN AND RHENIUM. E. H. Huffman, R. L. Oswalt, and L. A. Williams. Feb. 28, 1956. 12p. Contract W-7405-eng-48. \$0.15(OTS).

3793 Y-559

Carbide and Carbon Chemicals Co. Y-12 Plant, Oak Ridge, Tenn.

PREPARATION OF PURE ZIRCONIUM OXIDE. PROGRESS REPORT. Chemical Research Division. W. M. Leaders, L. P. Twichell, J. W. Ramsey, F. B. Waldrop, P. B. Petretzky, and R. D. Williams. Feb. 1, 1950. Decl. Nov. 18, 1955. 32p. Contract W-7405-eng-26. \$0.25(OTS).

A thiocyanate process has been developed for the removal of Hf from Zr and subsequent purification of Zr with respect to other impurity elements. The Zr product contains less than 150 ppm Hf and meets other specification limits. The process consists of an extraction phase for removal of Hf, a precipitation for removing other impurities, and two separate recycle systems for recovery and reuse of reagents. (auth)

3794 Y-612

Oak Ridge National Lab., Y-12 Area, Tenn.

ZIRCONIUM-HAFNIUM SEPARATION: MIXER-SETTLER STUDIES. Final Report. F. B. Waldrop, W. T. Ward, and W. M. Leaders. June 6, 1950. Decl. Nov. 17, 1955. 31p. Contract W-7405-eng-26. \$0.25(OTS).

Refer also to abstract 3786.

TRANSURANIC ELEMENTS AND COMPOUNDS

Refer to abstract 3797.

TRITIUM AND TRITIUM COMPOUNDS

3795 LA-742

Los Alamos Scientific Lab., N. Mex.

THE PREPARATION AND REDUCTION OF DIVINYLA-CETYLENE. D. L. Williams and A. R. Ronzio. Aug. 15, 1949. Decl. Apr. 20, 1956. 16p. Contract W-7405-eng-36. \$3.30(ph OTS); \$2.40(mf OTS).

The synthesis and chemical properties of divinylacetylene (1,5-hexadien-3-yne) were investigated. The preparation of tritium-labeled hexane by a catalytic reduction of divinylacetylene was also studied. (C.W.H.)

URANIUM AND URANIUM COMPOUNDS

3796 AECD-3713

Carbide and Carbon Chemicals Co. K-25 Plant, Oak Ridge, Tenn.

A GLASS STILL FOR THE EVALUATION OF COLUMN PACKING WITH URANIUM HEXAFLUORIDE. R. M. McGill. July 2, 1951. Decl. with deletions Dec. 7, 1955. 17p. Contract W-7405-eng-26. \$0.20(OTS).

3797 NAA-SR-1057

North American Aviation, Inc. Downey, Calif.

THE EVAPORATION OF PLUTONIUM FROM SMALL PIECES OF URANIUM REACTOR FUEL. Daniel Cubicciotti. Oct. 15, 1954. Decl. Dec. 12, 1955. 18p. Contract AT-11-1-GEN-8. \$0.20(OTS).

The rate of evaporation of Pu from U containing initially about 0.01% Pu has been measured at 1600 and 1680°C. The results show that the rate of evaporation follows the equations based on Raoult's Law. The evaporation of

fission products was approximately as expected from their relative vapor pressures. (auth)

3798 ORNL-2035

Oak Ridge National Lab., Tenn.

RAW MATERIALS PROCESS TESTING. Engineering Section Progress Report [for] May-June 1955. K. O. Johnson, ed. Apr. 16, 1956. 21p. Contract W-7405-eng-26. \$0.20(OTS).

The effects of pH on the effectiveness of Cl^- as an agent for stripping U from amine extracts were investigated. Sodium carbonate solutions were also used for stripping U from amine extracts. Studies were continued on the effects of mixing variables on rate of extraction of U from leach solutions and amount of organic entrainment. (For preceding period see ORNL-2034.) (C.W.H.)

3799 WIN-11

National Lead Co., Inc. Raw Materials Development Lab., Winchester, Mass.

PRELIMINARY PILOT PLANT TESTING OF RESIN-IN-PULP ION EXCHANGE OF ALKALINE LEACH PULPS. C. K. McArthur, T. F. Izzo, R. G. Beverly, A. W. Griffith, and R. L. Shimmin. Apr. 25, 1955. Decl. Sept. 19, 1955. 21p. Contract AT(49-6)-924. \$0.20(OTS).

Utex ore was treated in the Resin-in-Pulp Pilot Plant circuits to determine the possibility of recovering U from alkaline leach pulps. A tentative alkaline Resin-in-Pulp Pilot Plant flowsheet was established. Data are presented on the recovery by adsorption units as well as information on the elution and precipitation of U concentrate. (auth)

Refer also to abstract 3780.

ENGINEERING

HEAT TRANSFER AND FLUID FLOW

3800 ANL-5409

Argonne National Lab., Lemont, Ill.

THE TRANSIENT BEHAVIOR OF SINGLE-PHASE NATURAL CIRCULATION WATER LOOP SYSTEMS. C. D. Alstad, H. S. Isbin, N. R. Amundson, and J. P. Silvers. Mar. 1956. 55p. Contract W-31-109-eng-38. \$0.35(OTS).

3801 LA-1930

Los Alamos Scientific Lab., N. Mex.

A NUMERICAL METHOD FOR TREATING FLUID FLOW IN THE PRESENCE OF SHOCKS. Rolf Landshoff. Jan. 19, 1955. 40p. Contract [W-7405-eng-36]. \$0.30(OTS).

A numerical method to calculate the flow of a compressible fluid in the presence of shocks is presented. This method permits a number of variations which were compared by testing them on some analytically known one-dimensional flow patterns. The calculations were carried out on the Los Alamos "MANIAC." (auth)

MATERIALS TESTING

3802 AEC-tr-2438

AN EXAMPLE OF THE INTRODUCTION OF ELECTROMAGNETIC SORTING INTO THE MANUFACTURE OF DIESEL INJECTION PUMPS AND EJECTORS. Richard Hainz. Translated from *Z. Metallkunde* 45, 238-42(1954). 6p.

Electromagnetic sorting was tried as a method of testing the state of surface annealing, surface hardness and structure but was not satisfactory. A more accurate sorting process was attained. The investigation confirmed the established relation between penetration hardness and the residual field. (F.S.)

PUMPS

3803 AEC-tr-2444

VALVE CONSTRUCTION OF PUMPS WITH VERTICAL PISTONS. Albert Doering. Translated by D. E. Cardamon from German Patent No. 805 005. 2p.

MINERALOGY, METALLURGY, AND CERAMICS

3804 KAPL-1523

Knolls Atomic Power Lab., Schenectady, N. Y.

REMOTE OPERATING "TUKON" HARDNESS TESTER. E. R. Craig and R. F. Stearns. Dec. 21, 1955. 19p. Contract W-31-109-Eng-52. \$0.25(OTS).

A Wilson "Tukon" Hardness Tester was put into remote operation. A closed circuit television system is used to bring the microscope image to the outside of a shielded cell. (auth)

CORROSION

3805 AECD-3717

Oak Ridge National Lab., Tenn.

PITTING CORROSION OBSERVED ON ACTIVE AND DUMMY FUEL ELEMENTS FROM THE BULK SHIELDING REACTOR. A. R. Olsen, J. L. English, E. L. Compere, and E. G. Bohlmann. Nov. 18, 1954. Decl. Nov. 18, 1955. 23p. Contract W-7405-eng-26. (CF-54-11-15). \$0.25(OTS).

3806 AECD-3735

National Lead Co. of Ohio, Cincinnati.

CORROSION IN A NITRIC ACID CONCENTRATOR. Fred H. Meyer, Jr. [nd.] Decl. Jan. 9, 1956. 11p. \$3.30(ph OTS); \$2.40(mf OTS).

Corrosion rates of stainless steels and other construction materials in nitric acid concentrator process solutions under operating conditions were determined. Stainless steel No. 347 showed lower corrosion rates in boiling HNO_3 -HF solutions under reduced pressures. (C.W.H.)

3807 BMI-T-55

Battelle Memorial Inst., Columbus, Ohio.

THE CORROSION OF ZIRCONIUM IN 600°F WATER AND IN 750°F SUPERHEATED STEAM. H. A. Pray and R. S. Peoples. Jan. 15, 1951. Decl. Nov. 30, 1955. 30p. Contract W-7405-eng-72. \$0.25(OTS).

GEOLOGY AND MINERALOGY

3808 AEC-tr-2441

PHOTOGRAPHIC EXAMINATION OF THE RADIOACTIVE SAMPLES PROCEEDING FROM BAJA CALIFORNIA. H.

Wolfgang Nelson. Sept. 1955. Literal translation by John B. Dorsh. 7p.

METALS AND METALLURGY

3809 BMI-79

Battelle Memorial Inst., Columbus, Ohio.

DEVELOPMENT OF ZIRCONIUM ALLOYS. PART I.

A. D. Schwoppe, L. L. Marsh, and W. Chubb. Aug. 8, 1951. Decl. Nov. 30, 1955. 23p. Contract W-7405-eng-92. \$0.25(OTS).

A number of alloys of Zr were investigated as part of a program aimed at improving the high-temperature tensile strength of zirconium. These alloys include Mo, Ta, W, Sn, Ti, and N alloys. It was found that small additions of Mo, Ta, Sn, Ti, and N appreciably increase the high-temperature tensile strength of Zr. (auth)

3810 BMI-717

Battelle Memorial Inst., Columbus, Ohio.

THE CLADDING OF ZIRCONIUM. H. A. Saller, J. R.

Keeler, and E. R. Szumachowski. Dec. 20, 1951. Decl. Nov. 9, 1955. 13p. Contract W-7405-eng-92. \$0.15(OTS).

Zirconium was rolled clad with Ni, Monel, Inconel, Ti, and an 18-8 stainless steel. With the exception of Ti, all of these metals formed compounds at the zirconium interface and the resulting bonds had poor mechanical properties. The Ti-Zr bond had good strength and ductility and showed no tendency to crack during thermal cycling. Sandwich-type diffusion couples of Zr with Cu, Mo, Pt, Ag, and Ta indicated that all of these metals formed hard, brittle diffusion products with zirconium. (auth)

3811 BMI-718

Battelle Memorial Inst., Columbus, Ohio.

DEVELOPMENT OF ZIRCONIUM ALLOYS. PART II.

A. D. Schwoppe and W. Chubb. Jan. 2, 1952. Decl. Nov. 9, 1955. 25p. Contract W-7405-eng-92. \$0.20(OTS).

A number of alloys of Zr have been investigated as part of a program aimed at improving the high-temperature tensile and creep strength of Zr. These alloys include Al, Be, Pb, Mg, Mo, Nb, Ta, Sn, Ti, W, V, and Zn, binary and ternary alloys. The data indicate that Al, Pb, Mo, Nb, Sn, Ti, W, and V can be used successfully to harden Zr, and that Al, Sn, Ti, and V are particularly effective in maintaining the strength of Zr at elevated temperatures. (auth)

3812 BMI-732

Battelle Memorial Inst., Columbus, Ohio.

ELECTROPLATING ON BERYLLIUM. J. G. Beach and

C. L. Faust. Apr. 1, 1952. Decl. Nov. 9, 1955. 48p. Contract W-7405-eng-92. \$0.30(OTS).

Two methods are described for electroplating on Be. One method involves electrochemical and chemical activation of the Be surfaces for direct plating with metals (Ni, Fe, Cu, Al, Ag, Sn, and speculum). The other method involves the application of a replacement film of Zn on the Be surfaces followed by strike plating with Cu or Ni from baths suitable for plating on Zn. After strike plating, subsequent plating is the same as for plating on the strike metal. (auth)

3813 BMI-751

Battelle Memorial Inst., Columbus, Ohio.

ZIRCONIUM ALLOYS FOR NUCLEAR REACTOR APPLI-

CATIONS. A. D. Schwoppe and W. Chubb. June 11, 1952.

Decl. Nov. 30, 1955. 22p. Contract W-7405-eng-92.

\$0.20(OTS).

A number of binary and ternary zirconium-base alloy systems have been investigated in an attempt to develop a zirconium alloy for nuclear reactor applications. The tensile, hot-hardness, corrosion, and heat-treating properties of these alloys have been determined. Several zirconium-base alloys have been found with 0.2% offset yield strengths at 500°C in excess of 30,000 psi. These alloys possess various combinations of nuclear characteristics, ductility, and corrosion resistance. (auth)

3814 BMI-818

Battelle Memorial Inst., Columbus, Ohio.

MECHANICAL PROPERTIES OF TERNARY ZIRCONIUM

ALLOYS. A. D. Schwoppe and W. Chubb. Apr. 21, 1953.

Decl. Nov. 22, 1955. 24p. Contract W-7405-eng-92. \$0.20(OTS).

A number of ternary Zr-base alloys have been prepared in an attempt to develop a Zr alloy with high strength at elevated temperatures. These alloys contain various amounts and combinations of Al, Pb, Mo, Nb, Sn, Ti, and V. The tensile properties, hot hardness, corrosion resistance, and heat-treating characteristics of these alloys have been investigated. Several alloys have been found with 0.2% offset yield strengths at 500°C in excess of 30,000 psi. The relative merits of these alloys are discussed. (auth)

3815 BMI-835

Battelle Memorial Inst., Columbus, Ohio.

BISMUTH-ALLOY COATINGS ON ALUMINUM. H. A.

Saller, J. R. Keeler, D. L. Keller, and J. G. Beach. May 28, 1953. Decl. Nov. 22, 1955. 24p. Contract W-7405-eng-92. \$0.20(OTS).

Several methods for obtaining a 0.004-in.-thick high-Bi alloy layer on the flat surface of an Al target were investigated. Efforts to deposit or bond a cast Bi-Ni alloy onto an Al or Ni surface were unsuccessful. Most encouraging results were obtained by electroplating alternate layers of Ni and Bi on a simulated target face followed by a diffusion heat treatment to obtain the desired alloy layer. Aluminum targets were plated both with multiple layers of Ni and Bi and a single layer of Ni and Bi. (auth)

3816 BMI-866

Battelle Memorial Inst., Columbus, Ohio.

THE CREEP PROPERTIES OF THORIUM. A. D. Schwoppe,

L. L. Marsh, and F. R. Shober. Sept. 11, 1953. Decl.

Nov. 22, 1955. 22p. Contract W-7405-eng-92. \$0.20(OTS).

The creep properties of Th have been determined at 200°F, 400°F, and 600°F under constant load conditions. The deformation of Th by creep at 400°F and 600°F appears to be modified by an aging process which results in a lower creep rate at 400°F than the same stress would produce at 200°F. From the observed results, design considerations for the use of Th under cyclic load conditions in the temperature range from 200°F to 600°F should be based largely on fatigue strength, rather than on creep strength. (auth)

3817 MIT-1092

Massachusetts Inst. of Tech., Cambridge. Metallurgical Project.

BENEFICIAL EFFECT OF ALLOY ADDITIONS TO ZIRCONIUM ON THE CORROSION RESISTANCE IN 600°F

WATER. D. S. Kneppel and T. T. Magel. Apr. 21, 1952. Decl. Oct. 18, 1955. 11p. Contract AT(20-1)-981. \$0.20(OTS).

Results of tests indicate that the additions of Fe, Ne, or Cr will allow higher levels in impurities in Zr and still maintain good corrosion resistance in steam and 600°F

water. The feasibility of producing corrosion resistant graphite-melted alloys is indicated. The beneficial effects of alloying elements on corrosion resistance are tabulated. (J.E.D.)

3818 SEP-54

Sylvania Electric Products Inc., Bayside, N. Y.
THE CREEP OF ZIRCONIUM IN WATER FROM 400° TO 600°F. D. R. Brunstetter, N. P. Kling, and B. H. Alexander. Apr. 20, 1951. Decl. Nov. 29, 1955. 15p. Contract AT-30-1-Gen-366. \$0.20(OTS).

2000-hour creep tests were made on 0.015-in. zirconium wire in water at temperatures ranging from 400 to 600°F. Values of secondary creep were determined and limiting creep stresses were obtained for creep rates of 0.1% and 1.0% in 1000 hr. Total elongation was measured after the test run of 2000 hr. (auth)

3819 SEP-91

Sylvania Electric Products Inc. Metallurgical Lab., Bayside, N. Y.

THERMAL EXPANSION OF ZIRCONIUM AND ZIRCONIUM-TIN ALLOYS UP TO 570°C. Marvin Moskowitz and L. W. Kates. June 9, 1952. Decl. Nov. 18, 1955. 12p. Contract AT-30-1-GEN-366. \$0.15(OTS).

Specimens of polycrystalline Zr and Zr-Sn alloys were tested for thermal expansion. From plots of length vs. temperature empirical equations of the second degree were derived. These equations represent the thermal linear expansion of the samples between 30 and 570°C. From the equations are derived the instantaneous linear coefficients at any temperature. The relationship between Sn content and linear coefficient at any temperature is discussed. (auth)

3820 Y-817

Carbide and Carbon Chemicals Co. Y-12 Plant, Oak Ridge, Tenn.

PRODUCTION OF ZIRCONIUM AT Y-12. J. W. Ramsey and W. K. Whitson, Jr. Oct. 12, 1951. Decl. Nov. 17, 1955. 39p. Contract W-7405-eng-26. \$0.30(OTS).

A general description is given of the permanent zirconium plant at Y-12. Equipment is described and materials of construction are listed. Photographs illustrating principal equipment and reduced construction drawings are also presented. Operating conditions and costs information are listed. (auth)

3821 SO-2046

General Electric Co. Research Lab., Schenectady, N. Y.
SELF-DIFFUSION IN DILUTE BINARY SOLID SOLUTIONS, II. E. W. Hart, R. E. Hoffman, and D. Turnbull. Apr. 1956. 11p. Contract W-31-109-Eng-52. \$1.80(ph OTS); \$1.80(mf OTS). (56-RL-1530).

3822 AEC-tr-2442

THE ELECTROLYTIC POLISHING OF URANIUM IN THE LIGHT OF PHYSICS-CHEMICAL AND METALLOGRAPHIC STUDIES. Pierre-A. Jacquet and Roger Caillat. Translated by I. A. Warheit from *Compt. rend.* 228, 1224-6(1949). 4p.

In an investigation of electrolytic polishing of U for metallography, the anodic current density and the voltage at the cell terminals depend on the exact content of the perchloric acid in the electrolyte. Uranium dissolves anodically with a valence of 2 and decreases 1.9 μ in thickness/min. The U surface retains its luster in dry air and yellows by oxidation in air. (F.S.)

3823 AEC-tr-2445

ALUMINUM WORKING AND OILS. Karl Krekeler. Translated by D. E. Cardamone from *Aluminium* 17, 37-9(1934). 3p.

Refer also to abstracts 3793, 3887, and 3888.

PHYSICS

3824 AECD-3706

Los Alamos Scientific Lab., N. Mex.

LOW TEMPERATURE THERMAL EXPANSION OF VARIOUS MATERIALS. Henry L. Laquer. Dec. 9, 1952. Decl. with deletions Nov. 30, 1955. 58p. Contract W-7405-eng-36. \$0.40(OTS).

3825 IDO-16259

Phillips Petroleum Co. Atomic Energy Div., Idaho Falls, Idaho.

MTR TECHNICAL BRANCH QUARTERLY REPORT FOR FOURTH QUARTER [OF] 1955. W. P. Conner, ed. Mar. 12, 1956. 37p. Contract AT(10-1)-205. \$0.30(OTS).

3826 ISC-716

Ames Lab., Ames, Iowa.

INDUCTANCES OF SINGLE LAYER CYLINDRICAL COILS FOR INDUCTION HEATING APPLICATIONS. Charles R. Whitsett. Mar. 2, 1956. 49p. Contract W-7405-eng-82. \$0.35(OTS).

3827 AEC-tr-2423

ELECTRIC CONDUCTIVITY, VISCOSITY AND DENSITY OF THE FUSED BINARY SALT SYSTEMS WITH A SIMPLE EUTECTIC. I. P. Vereshchetina and N. P. Luzhnaja. Translated from *Izvest. Sektora Fiz. Khim. Anal. Inst. Obshchei Neorg. Khim. Akad. Nauk S.S.S.R.* 25, 188-207 (1954). 33p.

3828 AEC-tr-2424

MELTING POINTS AND VAPOR PRESSURES OF KRYPTON AND XENON. Kurt Peters and Kurt Weil. Translated by I. A. Warheit from *Z. physik. Chem.* 148A, 27-35(1930). 12p.

3829 AEC-tr-2433

CONTRIBUTION TO THE THEORY AND PRACTICE OF THE FIELD STRENGTH DIFFERENCE MEASURING APPARATUS MAGNETIC FIELDS AFTER FÖRSTER. Max Wurm. Translated from *Z. Angew. Phys.* 2, 210-19(1950). 28p.

3830 AEC-tr-2440

THE RELATIONSHIP BETWEEN CONCENTRATION AND ACTIVITY IN FUSED SALT MIXTURES. H. Flood, T. Förland, and K. Grojtohelm. Translated from *Z. anorg. u. allgem. Chem.* 276, 289-315(1954). 45p.

The thermodynamics of fused salts and slags are discussed. The special conditions in systems of these types are taken into consideration and an attempt is made to calculate activities and equilibria. Ion exchange equilibria are considered and the activity of a salt component in a mixture of fused salts is calculated. (J.E.D.)

ELECTRICAL DISCHARGE

3831 AEC-tr-2428

ARTIFICALLY PRODUCED HEAVY CURRENT IMPULSE DISCHARGES UP TO 300,000 A. Rudolf Foitzik and Willi

Siemer. Translated from Verb. Detsch. Elektrotechniker Fachber. 10, 35-9(1938). 20p.

GASES

3832 AEC-tr-2448

SHOCK WAVES IN BINARY MIXTURES. S. P. Dyakov. Translated from Zhur. Eksptl. i Teoret. Fiz. 27, 283-7 (1954). 7p.

The structure of a weak shock wave in a binary mixture is examined with consideration of diffusion, thermal diffusion, and barodiffusion. (auth)

INSTRUMENTS

3833 AECD-3736

National Lead Co. of Ohio, Cincinnati.
THE DETECTION OF SHORT CIRCUITS IN THERMO-COUPLES BY A RADIO-FREQUENCY MEASUREMENT OF INDUCTANCE. Peter R. Morris. [nd.] Decl. Jan. 9, 1956. 7p. Contract AT(30-1)-1156. \$1.80(ph OTS); \$1.80(mf OTS).

3834 UCLA-354

California. Univ., Los Angeles. Atomic Energy Project.
SOME MODIFICATIONS AND TECHNIQUES APPLIED TO THE RCA TYPE EMU ELECTRON MICROSCOPE. F. W. Bishop. Nov. 10, 1955. 33p. Contract AT-04-1-GEN-12. \$0.25(OTS).

Information is compiled on many small modifications or improvements in the electron microscope which have been made over the past six years but which have not been published. It includes a description of a filament and high-voltage safety circuit, magnification interlock, ionization gauge shield, filament protection, fine condenser-control, mechanical stage springs, electron gun tilting and lateral adjustment controls, electron gun external connections, plated viewing screen, focus sensitivity control, cleaning screens, auxiliary tank air reservoir, compensating objective lens, high voltage safety circuit, a rapid alignment procedure for the electron microscope, and a water pressure monitor. (auth)

3835 AEC-tr-2434

MAGNETIC FIELD MEASUREMENTS WITH IRON CORE MAGNETOMETER WHICH USES HIGHER HARMONICS. Rudolf Kühne. Translated from Arch. Tech. Mess., No. 199, 175-8(1952). 14p.

The Förster Sonde method for magnetic field measurement makes use of harmonic generation in an iron core magnetometer which employs a core of high permeability surrounded by a coil carrying alternating electric current. The second harmonic, appearing at the terminals of the coil due to the reaction to an outside field, serves as a field strength measurement. The iron core magnetometer measures magnet fields and large direct currents and can be used as a magnetic modulator to measure very small current. (F.S.)

Refer also to abstract 3831.

ISOTOPES

Refer to abstract 3837.

ISOTOPE SEPARATION

3836 ORNL-1422

Oak Ridge National Lab., Y-12 Area, Tenn.
STABLE ISOTOPE SEPARATIONS IN Y-12. J. R. Walton, ed. July 1, 1952. Decl. Nov. 22, 1955. 194p. Contract W-7405-eng-26. \$1.00(OTS).

3837 K-1236

Oak Ridge Gaseous Diffusion Plant, Tenn.
SEPARATION OF ISOTOPES BY FLOW THROUGH POWDER PACKS WITH HIGH RATIO OF SURFACE AREA TO VOID VOLUME. W. G. Trawick and A. S. Berman. May 2, 1956. 34p. Contract W-7405-eng-26. \$6.30(ph OTS); \$3.00(mf OTS).

The separation of the isotopes of O, N, and A at 77°K by flow through a high surface area silica powder pack was measured. Under the conditions of the experiments (high ratio of surface area to void volume, and surface coverage of the order of one monolayer), the steady state separation factor was found to be lower than the ideal value for molecular streaming. A mass spectrometer was used for the isotopic analyses. (auth)

MATHEMATICS

3838 DC-55-7-41

General Electric Co. Aircraft Nuclear Propulsion Dept., Cincinnati.

DIODE SIMULATION OF A FUNCTION OF TWO VARIABLES. Laurier A. Wood. June 27, 1955. 17p. \$3.30(ph OTS); \$2.40(mf OTS).

A system for the generation of a function of two variables is outlined. It is shown how the method of connected line segment, already employed in an available analog component, may be extended in terms of practical equipment to apply to functions of two or more variables. (B.J.H.)

3839 WAPD-146

Westinghouse Electric Corp. Bettis Plant, Pittsburgh.
DERIVATION OF THE EQUATIONS FOR THE ONE-DIMENSIONAL SLAB AND CYLINDRICAL MULTIGROUP TRANSPORT CODES. D. Schiff. Mar. 1956. 26p. Contract AT-11-1-Gen-14. \$0.25(OTS).

The formulas used in the one-dimensional flexible transport codes are derived from the static integrodifferential transport equation. The method of solution is described, with application to problems in neutron scattering. (auth)

3840 AEC-tr-2460

STABILITY BEHAVIOR OF SYSTEMS OF CANONICAL DIFFERENTIAL EQUATIONS. Jürgen Moser. Translated from Nachr. Akad. Wiss. Göttingen, Math.-physik. Kl., IIa, No. 6, 87-120(1955). 37p. Available from Associated Technical Services (Trans-26H9G), East Orange, N. J.

An investigation of the stability behavior of the simplest type of canonical differential equations with reference to the stability of the orbits of the planets and the moon is presented. (F.S.)

MEASURING INSTRUMENTS AND TECHNIQUES

3841 K-1272

Oak Ridge Gaseous Diffusion Plant, Tenn.
A SMALL AND INEXPENSIVE SIGNAL CAN FOR THE SPACE RECORDER. G. A. Smith. Apr. 25, 1956. 11p.

Contract W-7405-Eng-26. \$3.30(ph OTS); \$2.40(mf OTS).

The design of a new signal can or ionization chamber to be used with the Space Recorder is discussed. The Space Recorder is an instrument used to measure concentrations of radioactive gas, normally less than 2%, in a non-radioactive gas such as nitrogen. These improvements were made primarily to reduce the cost and size of the unit. The new signal can is one-third the size of the old can, is appreciably lighter, and costs about one-fourth as much as the old signal can. The new can was extensively tested to determine that it is the functional equivalent of the older can. All signal cans required in the future will utilize this improved design. (auth)

3842 K-1284

Oak Ridge Gaseous Diffusion Plant, Tenn.
IMPROVEMENTS TO THE ARGON GAMMAGRAPH—A WIDE RANGE GAMMA MONITOR. G. A. Smith. May 3, 1956. 26p. Contract W-7405-Eng-26. \$0.25(OTS).

3843 KAPL-1467

Knolls Atomic Power Lab., Schenectady, N. Y.
A REMOTELY OPERATED RADIATION SURVEY METER. L. C. Cooper. Jan. 1, 1956. 6p. Contract W-31-109-Eng-52. \$0.15(OTS).

An illustrated description is presented of a remotely operated multi-range β - γ radiation survey meter. (C.H.)

3844 MLM-1003

Mound Lab., Miamisburg, Ohio.
DETERMINATION OF RADIUM-226, ACTINIUM-227, AND THORIUM-228 IN HUMAN URINE. (Ad Interim Report). H. W. Kirby and R. M. Brodbeck. Aug. 20, 1954. 21p. Contract AT 33-1-Gen-53. \$0.25(OTS).

3845 NYO-3784

Bausch and Lomb Optical Co., Rochester, N. Y.
IRRADIATION DAMAGE TO GLASS. N. J. Kreidl and J. R. Hensler. Nov. 15, 1955. 28p. Contract AT(30-1)-1312. \$4.80(ph OTS); \$2.70(mf OTS).

MESONS

3846 UCRL-3275

California. Univ., Berkeley. Radiation Lab.
THE RATIOS OF LIFETIMES OF HEAVY MESONS AND HYPERONS AS PREDICTED BY PHASE SPACE. M. Lynn Stevenson. Feb. 1, 1956. 12p. Contract W-7405-eng-48. \$3.30(ph OTS); \$2.40(mf OTS).

3847 UCRL-3284

California. Univ., Berkeley. Radiation Lab.
ANALYSIS OF ONE HUNDRED BEVATRON τ^+ PARTICLES. Roy P. Haddock. Feb. 7, 1956. 24p. Contract W-7405-eng-48. \$4.80(ph OTS); \$2.70(mf OTS).

One hundred τ^+ mesons, obtained from nuclear emulsion stacks exposed to the K^+ beam at the Bevatron, are analyzed for the Q value of the tau decay and possible values of the spin-parity of the tau. A Q of $75.13 \pm .20$ Mev is obtained. The corresponding tau mass is $966.5 \pm .74 m_e$. The analyses by Dalitz and Fabri were used to assign possible spin-parity values to the tau. The case of 0- gives the best agreement with the observed energy and angle distributions. (auth)

3848 UCRL-3289

California. Univ., Berkeley. Radiation Lab.
COMPOSITION OF A SECONDARY-PARTICLE BEAM

FROM THE BEVATRON. Frances M. Smith, Harry H. Heckman, and Walter H. Barkas. Mar. 8, 1956. 10p. Contract W-7405-eng-48. \$0.15(OTS).

MOLECULAR PROPERTIES

3849 AEC-tr-2431

THE REFLECTION AT CRYSTAL-SPLITTING PLANES OF THE MOLECULAR RAYS EMITTED BY MERCURY. (Die Reflexion von Quecksilber-Molekularstrahlen an Kristallspaltflächen). B. Josephy. Translated from *Z. Physik* **80**, 755-62(1933). 10p.

In the reflections of Hg molecular rays on the crystal-splitting planes of NaCl and LiF it was found that a diffused reflection exists, but deviations from the law of reflection can not be explained but may be due to different kinds of preliminary treatment of crystals. A hot-wire manometer measured the intensity of the Hg rays. (F.S.)

NEUTRONS

3850 CF-56-3-170

Oak Ridge National Lab., Tenn.
NEUTRON SELF-SHIELDING OF A PLANE ABSORBING FOIL. Joel Bengston. Mar. 1, 1956. 47p. Contract W-7405-eng-26. \$7.80(ph OTS); \$3.30(mf OTS).

The flux depression in a plane foil of pure absorber placed in an infinite medium is calculated by a number of approximate methods. It is found that procedures based on analytic iteration of the integral form of the transport equation cannot easily be made to yield dependable results. The new double spherical harmonic method developed by Yvon is combined with an exact treatment of neutron transmission through the foil to give a quite accurate answer for the flux depression. It is demonstrated numerically that the accuracy of the double P_1 approximation is comparable to that of the ordinary P_5 method, although it is equivalent to the less accurate P_3 method in complexity. A simple formula for the flux depression has been derived by a modification of the Serber-Wilson method and found to give a result which is never more than 3% greater than the correct value. (auth)

NUCLEAR PHYSICS

3851 AECU-3173

California Inst. of Tech., Pasadena. Norman Bridge Lab. of Physics.

FUNDAMENTAL RESEARCH IN NUCLEAR SPECTROSCOPY AND X-RAYS. Annual Report No. 1 for Period October 1, 1954 to September 30, 1955 [on] RESEARCH IN PRECISION SPECTROSCOPY OF NUCLEAR ENERGY LEVELS. Jesse W. M. DuMond. June 1955. 57p. Contract AT(04-3)-63. \$9.30(ph OTS); \$3.60(mf OTS).

Brief summaries are given of the development of a 2-meter curved crystal spectrometer and of a homogeneous field ring focusing β -ray spectrometer. A complete description is given of the β -ray spectrometer, and preliminary studies were made of its performance. L subshell conversion coefficients for E-2 transitions between 100 and 500 kev were measured and are tabulated. Results show good agreement with theory. Data are also given on L-

shell U photoelectrons. Gamma transitions in Ce^{144} were studied. Studies on the decay of Ta^{183} were completed, and data for transitions in W^{183} and W^{182} are tabulated. The energy levels of W^{183} and W^{182} are also shown. The proposed decay scheme of Lu^{177} is shown, and γ transitions in Hf^{177} are shown. Gamma lines emitted by a La^{140} source are tabulated. The energy levels in Pt^{192} and Os^{192} were also investigated. The first excited levels in Os^{196} and W^{186} are given. Other progress in spectroscopy is summarized. (B.J.H.)

3852 CU-144

Columbia Univ., New York. Nuclear Physics Labs. PROGRESS REPORT FOR APRIL, MAY, JUNE 1954 TO THE UNITED STATES ATOMIC ENERGY COMMISSION. 28p. Contract AT-30-1-GEN-72. \$4.80(ph OTS); \$2.70 (mf OTS).

3853 NAA-SR-845

North American Aviation, Inc., Downey, Calif. REACTOR EVALUATION QUARTERLY PROGRESS REPORT FOR AUGUST-OCTOBER 1953. R. J. Beeley, ed. Mar. 1, 1954. Decl. Nov. 9, 1955. 16p. Contract AT-11-1-GEN-8. \$0.20(OTS).

3854 UCRL-3326

California. Univ., Berkeley. Radiation Lab. PHYSICS DIVISION QUARTERLY REPORT FOR NOVEMBER, DECEMBER 1955, JANUARY 1956. Feb. 27, 1956. 42p. Contract W-7405-eng-48. \$0.30(OTS).

NUCLEAR REACTORS

3855 AECD-3699

Phillips Petroleum Co. Atomic Power Div., Idaho Falls, Idaho.

XENON-135 GENERATION IN THE MATERIALS TESTING REACTOR. D. R. deBoisblanc and W. E. Nyer. May 14, 1953. Decl. with deletions Aug. 29, 1955. 21p. Contract AT(10-1)-205. \$0.20(OTS).

A measurement was made at the MTR to determine the absolute value of the product of the Xe^{135} cross section and the I^{135} fission yield. Because of the importance of this quantity in determining the behavior of reactors after a power reduction, this information was considered to be valuable. (auth)

3856 AECD-3707

Phillips Petroleum Co. Atomic Energy Div., Idaho Falls, Idaho.

MTR TECHNICAL BRANCH QUARTERLY REPORT. Fourth Quarter-1954. J. R. Huffman. Mar. 31, 1955. Decl. with deletions Oct. 5, 1955. 39p. Contract AT(10-1)-205. \$0.30(OTS).

The fission breaks which have occurred in the MTR, first reported last quarter, have been traced to the bulging outward of the lower ends of the outside concave fuel plates of the fuel assemblies. By hydraulic tests in the MTR and pressure tests on assemblies, both at the MTR and ORNL, a pressure differential outward of greater than five psi will cause this bulging on 0.050-inch thick plates with 0.110-inch side plates. The differential as measured in the MTR was 11 psi. Increasing the inside area and the outside dimensions of the bottom end box on the fuel assembly has reduced this differential to below 5 psi. In addition, all new fuel assemblies will have 0.085-inch thick outside

plates and $\frac{3}{16}$ -inch side plates to increase their strength. Higher than normal activity in the process water system still existed after the fuel assembly problem was corrected. From tests it is concluded that some uranium has plated out on the metal parts of the lattice and is slowly being removed by fission. Total cross sections on the crystal spectrometer have been reported on zirconium, hafnium, Np^{237} , Li^7 , sodium, potassium, and rubidium. A second naturally occurring isotope of tantalum was predicted. The resonance parameters of silver, tantalum, and U^{238} were measured on the time-of-flight spectrometer. Plans are continuing for work on fission cross sections and eta measurements. Activation cross sections of Pa^{233} have been refined. The program on the determination of activation cross sections by second order captures has produced results for the cross sections of Y^{90} , Pr^{142} , Ta^{182} and Tb^{160} . (auth)

3857 AECD-3709

Knolls Atomic Power Lab., Schenectady, N. Y. THE THERMODYNAMICS OF REDUCIBILITY OF FISSION PRODUCT OXIDES BY SODIUM AND OTHER ELEMENTS. Leo F. Epstein and Joanne Nigriny. Apr. 27, 1948. Decl. Nov. 3, 1955. 20p. Contract W-31-109-Eng-52. (MEMO-LFE-1) \$0.20(OTS).

Thermodynamic data on the free energies of formation of 58 oxides from the constituent elements are computed at 25, 500, and 1000°C. Reducibility by Na, H_2 , and C are shown in tabular form. The application of these computations to the depletion of liquid Na in pile designs using UO_2 fuel and liquid Na coolant in sealed units is discussed, and it is concluded that, if the kinetics of the reaction are favorable, only 7% of the Na will be lost by conversion to Na_2O after 10% burn-up in a system initially containing one atom of Na per molecule of UO_2 . (auth)

3858 AECD-3711

California Research Corp., Richmond, Calif. SUMMARY EVALUATION OF ORGANICS AS REACTOR MODERATOR-COOLANTS. R. O. Bolt and J. G. Carroll. Mar. 15, 1955. Decl. with deletions Nov. 10, 1955. 9p. \$0.15(OTS).

The information presently available on the use of certain organic compounds as reactor moderator-coolants is summarized. Included are data on the effects of aromatic structure on thermal stability, temperature and thermal stability, and radiation stability of various organic compounds. It is concluded that di- and polyphenyl types are the most promising organic materials for use, that the maximum temperature at which the most stable organic materials may be used is the order of 900°F, that at irradiation temperatures up to about 700°F, the controlling exposure condition is integrated radiation flux, that between 700°F and 900°F, the integrated flux and exposure temperatures are dependent variables, that high-energy, short-range particles should be avoided through cladding of fuel elements, and that stability limitations of the most radiation-stable organic materials are such that a purification system must be a part of any reactor setup. (B.J.H.)

3859 AECD-3720

Oak Ridge National Lab., Tenn. FAST NEUTRON SPECTRA OF THE BSF REACTOR. Robert G. Cochran and Keith M. Henry. May 29, 1953. Decl. Nov. 17, 1955. 11p. Contract W-7405-eng-26. (CF-53-5-105). \$0.15(OTS).

3860 AECD-3721

Oak Ridge National Lab., Tenn.

FAST-NEUTRON SPECTRUM OF THE LITR. R. G.

Cochran and K. M. Henry. Dec. 31, 1953. Decl. Nov. 17, 1955. 8p. Contract W-7405-eng-26. (CF-53-12-51). \$0.15(OTS).

The fast neutron flux of the LITR was measured by a fast-neutron spectrometer positioned near the HB-2 hole, with the neutron beam collimated by an Al tube surrounded with H_2O . The graphical results are similar to Watt's fission spectrum data, and the best fit was obtained by the expression $N(E) = 2.0 \times 10^6 \sinh(2E)^{1/2} e^{-E}$. (C.H.)

3861 ANL-5532

Argonne National Lab., Lemont, Ill.

RESULTS OF RECENT ANALYSES OF BORAX II TRANSIENT EXPERIMENTS. A. J. Ulrich. Apr. 1956. 30p. Contract W-31-109-eng-38. \$0.40(OTS).

Heat transfer information relating to the shutdown mechanism of the Borax II reactor is discussed. Pertinent quantities are presented as a function of time for a typical power transient. A proportionality is established between the transient steam pressure pulse and $-K_{ex}$. The heat transfer from fuel plate to water is divided into conduction and boiling phases. Conduction and boiling are shown to exhibit equilibrium behavior except during the transient steam pressure pulse. Because of the incompleteness of the data a definitive description of the phenomena during this pulse is not possible. (auth)

3862 ANL-5552

Argonne National Lab., Lemont, Ill.

A GENERALIZED REACTOR FACILITY FOR NUCLEAR TECHNOLOGY TRAINING AND RESEARCH. Interim Report on "ARGONAUT". D. H. Lennox and B. I. Spinrad. Mar. 1956. 20p. Contract W-31-109-Eng-38. \$0.30(OTS).

The status of the "Argonaut", a generalized reactor facility for nuclear technology training and research, is discussed. The Argonaut is a thermal reactor consisting of an annual cylindrical core with an internal and external graphite reflector. The core is heterogeneous, the fuel elements consisting of Borax-type fuel plates in assemblies ca. $3 \times 6 \times 24$ ft. The fuel element moderator is H_2O , and graphite separators are placed between the elements. The reactor is capable of operation at 10 kw of thermal power, and a flux of 10^{11} thermal neutrons/cm/sec are available at this power. The critical loading of the system is expected to be less than 4 kg of U^{235} at 20% enrichment. It is believed that the pile could be brought into operation for less than \$100,000. Component details are described, and diagrams of the reactor are given. (B.J.H.)

3863 BNL-86

Brookhaven National Lab., Upton, N. Y.

TEMPERATURE OF AND STRESSES IN CYLINDRICAL FUEL ELEMENTS DURING PILE FLASHES. APPLICATION TO BROOKHAVEN REACTOR. Melville Clark, Jr. Oct. 1950. Decl. Nov. 23, 1955. 30p. \$0.25(OTS).

Calculations are made of the temperature distribution and consequent stress distribution in cylindrical fuel elements as a function of time for various rates of reactor power increase. Complete equations are given for the case in which the neutron density is constant throughout the fuel element and also for the case in which the density varies, in accordance with neutron diffusion theory, across the fuel element. It is concluded that for the case in which a reactor produces an ultimate power of 30 megawatts in a flash, the

worst stresses are found to be below the anelastic limit, about 32,000 psi but above the proportional limit, roughly, 10,000 psi. Thus the U is safely stressed, providing it is not completely cycled too many times. (B.J.H.)

3864 BNL-123

Brookhaven National Lab., Upton, N. Y.

AXIAL HEAT DISTRIBUTION IN BROOKHAVEN REACTOR. Melville Clark, Jr. July 1951. Decl. Nov. 23, 1955. 23p. \$0.25(OTS).

3865 BNL-1150

Brookhaven National Lab., Upton, N. Y.

SERIAL REPORTS ON START-UP EXPERIMENTS. NO. 2. THE UNIFORM TEMPERATURE COEFFICIENT OF THE BNL REACTOR. J. Chernick and J. W. Kunstadter. Jan. 17, 1951. Decl. Nov. 14, 1955. 15p. Contract AT-30-2-Gen-16. \$0.20(OTS).

3866 BNL-1992

Brookhaven National Lab., Upton, N. Y.

THERMAL UTILIZATION MEASUREMENT. G. A. Price. Aug. 19, 1954. Decl. Nov. 9, 1955. 6p. \$0.15(OTS).

3867 BNL-2020

Brookhaven National Lab., Upton, N. Y.

THE TRANSMISSION OF NEUTRONS AND GAMMA-RAYS THROUGH AIR SLOTS. PART II. THE TRANSMISSION OF NEUTRONS THROUGH STRAIGHT SLOTS IN WATER. Robert D. Schamberger, Ferdinand J. Shore, and Harvey P. Sleeper, Jr. Sept. 1, 1954. Decl. Nov. 21, 1955. 31p. Contract AT-30-2-Gen-16. \$0.25(OTS).

3868 BNL-2025

Brookhaven National Lab., Upton, N. Y.

THE TRANSMISSION OF NEUTRONS AND GAMMA-RAYS THROUGH AIR SLOTS. PART VII. THE EFFECT ON THE NEUTRON TRANSMISSION OF CHANGING THE WALL MATERIAL OF AN AIR SLOT. Robert D. Schamberger, Ferdinand J. Shore, and Harvey P. Sleeper, Jr. Sept. 1, 1954. Decl. Nov. 21, 1955. 9p. Contract AT-30-2-Gen-16. \$0.15(OTS).

3869 BNL-2119

Brookhaven National Lab., Upton, N. Y.

MIGRATION AREAS OF FISSION NEUTRONS IN URANIUM-WATER LATTICES. H. Kouts, G. Price, K. Downes, R. Sher, and V. Walsh. Dec. 15, 1954. Decl. Oct. 31, 1955. 38p. \$0.30(OTS).

Measurements were made of the migration areas of fission neutrons in lattices of 0.600" diameter uranium rods in ordinary water. A range of water-to-uranium volume ratios from 1:1 to 4:1 was explored. Values were obtained in two different but related ways; the methods, analysis, and results are given and discussed. It is shown that the results are more consistent with a continuous slowing-down critical equation than they are with a one-group critical equation. (auth)

3870 IDO-16005

Phillips Petroleum Co. Atomic Energy Div., Idaho Falls, Idaho.

PRE-OPERATIONAL ACCEPTANCE TEST PROCEDURES FOR THE MATERIALS TESTING REACTOR. PART II. POST NEUTRON TESTS. Feb. 29, 1952. Decl. Sept. 12, 1955. 41p. Contract AT(10-1)-205. \$0.30(OTS).

An attempt is made to outline procedures which will be followed in the startup program. It is expected, however, that deviations may occur because of expediency or unforeseen circumstances. (auth)

3871 IDO-16064

Phillips Petroleum Co. Atomic Energy Div., Idaho Falls, Idaho.

PERMISSIBLE MTR POWER LEVELS WITH AND WITHOUT FILM BOILING. C. F. Leyse. Jan. 15, 1953. Decl. Nov. 15, 1955. 23p. Contract AT(10-1)-205. \$0.25(OTS).

Considering only the heat transfer situation in the active lattice, it is permissible to increase substantially the power level at which the MTR is operated. It is recommended that the power level not exceed that shown by the lower curve representing the maximum power levels that can be attained without inducing film boiling. If the bulk water temperature adjacent to the hottest part of the hottest fuel element can be maintained below 150°F, the power level could be increased to about 40 megawatts. The possibility of maintaining this temperature depends on the heat removal capabilities of the process water cooling system, which have not yet been investigated. Present evidence is not sufficient to permit recommending the operation of the MTR with film boiling. (auth)

3872 KAPL-1471

Knolls Atomic Power Lab., Schenectady, N. Y.

INTERACTION OF BLACK CONTROL RODS. J. C. Stewart and J. H. Smith. Jan. 8, 1956. 9p. Contract W-31-109-Eng-52. \$0.15(OTS).

One-velocity diffusion theory is employed to develop expressions for the reactivity of systems which contain interacting black control rods—cylinders, slabs, or crosses. The results extend the application possibilities of the Hurwitz-Roe absorption area calculations. (auth)

3873 MonP-246

Clinton Labs., Oak Ridge, Tenn.

MULTI-GROUP, MULTI-REFLECTOR PILE THEORY. H. L. Garabedian and A. S. Householder. Feb. 12, 1947. Decl. Sept. 20, 1955. 46p. Contract W-35-058-eng-71. \$0.35(OTS).

Multi-group, multi-reflector problems are considered for the infinite slab reactor, the spherical reactor, and the infinite cylindrical reactor. Detailed equations and solutions are given for each case. (B.J.H.)

3874 NAA-SR-924

North American Aviation, Inc., Downey, Calif.

REACTOR EVALUATION QUARTERLY PROGRESS REPORT FOR NOVEMBER 1953—JANUARY 1954. R. J. Beeley, ed. June 1, 1954. Decl. Nov. 9, 1955. 22p. Contract AT-11-1-GEN-8. \$20.00(OTS).

3875 ORNL-1790

Oak Ridge National Lab., Tenn.

COST STUDY OF A POWER INCREASE FOR THE BULK SHIELDING REACTOR. J. R. Bohannon. June 24, 1955. Decl. Nov. 22, 1955. 47p. Contract W-7405-eng-26. \$0.30(OTS).

Operation of the Bulk Shielding Reactor at a higher power level would require a modification of the present cooling system. Results are presented of a cost study of three possible cooling systems which could be used in the BSR. (C.H.)

3876 TID-8010

Technical Information Service, AEC.

THE PRESSURIZED WATER REACTOR FORUM HELD DECEMBER 2, 1955 AT MELLON INSTITUTE, PITTSBURGH. Feb. 1956. 74p. \$0.45(OTS).

One of its monograph series "The Industrial Atom."

The engineering and economic problems associated with

the application of pressurized water reactors to power generation are reviewed. The design and construction of the Shippingport facility is used to indicate the factors limiting economically feasible adaptation of this type reactor to commercial installations. (D.E.B.)

3877 WAPD-CE-41

Westinghouse Electric Corp. Atomic Power Div., Pittsburgh.

THERMAL STRESS PRODUCED BY TEMPERATURE TRANSIENTS. B. F. Langer. July 29, 1955. Changed from OFFICIAL USE ONLY Apr. 10, 1956. 7p. \$1.80 (ph OTS); \$1.80(mf OTS).

Charts, using dimensionless parameters, to be used for rapid evaluation of thermal stresses in reactor coolant systems, were prepared. (F.S.)

Refer also to abstracts 3805 and 3889.

NUCLEAR TRANSFORMATION**3878 UCRL-3259**

California, Univ., Berkeley. Radiation Lab.

THEORY OF NEUTRON PRODUCTION IN QUASI-ELASTIC EXCHANGE COLLISIONS (thesis). Edward U. Vaughan. Jan. 9, 1956. 98p. Contract W-7405-Eng-48. \$0.50(OTS).

RADIATION ABSORPTION AND SCATTERING**3879 BNL-2026**

Brookhaven National Lab., Upton, N. Y.

THE TRANSMISSION OF NEUTRONS AND GAMMA-RAYS THROUGH AIR SLOTS. PART VIII. THE EFFECT OF THE SOURCE SIZE ON THE NEUTRON TRANSMISSION OF AN AIR SLOT. Robert D. Schamberger, Ferdinand J. Shore, and Harvey P. Sleeper, Jr. Sept. 1, 1954. Decl. Nov. 21, 1955. Contract AT-30-2-Gen-16. \$0.20(OTS).

3880 ORNL-2019

Oak Ridge National Lab., Tenn.

AIR SCATTERING OF Co⁶⁰ GAMMA RAYS: THEORY VERSUS EXPERIMENT. Hubert S. Moran. Apr. 17, 1956. 7p. Contract W-7405-eng-26. \$1.80(ph OTS); \$1.80(mf OTS).

3881 UCLA-365

California, Univ., Los Angeles. Atomic Energy Project.

THE LINEAR ENERGY TRANSFER DISTRIBUTION OF PRIMARY COMPTON RECOIL DOSAGE. Benedict Cassen and Thomas G. Hennessy. Apr. 18, 1956. 16p. Contract AT-04-1-Gen-12. \$3.30(ph OTS); \$2.40(mf OTS).

RADIATION EFFECTS**3882 NAA-SR-287**

North American Aviation, Inc., Downey, Calif.

CYCLOTRON IRRADIATION DAMAGE OF THORIUM, STAINLESS STEEL, AND ZIRCONIUM. F. E. Bowman, A. Andrew, R. R. Eggleston, F. L. Fillmore, and C. J. Meechan. Apr. 1, 1954. Decl. Nov. 16, 1955. 30p. Contract AT-11-GEN-8. \$0.25(OTS).

The effects of cyclotron irradiation upon the hardness, the stress-strain relationship, and the electrical resistance of Th, 347 stainless steel, and Zr was determined. The irradiations were carried out below -100°C on the

60-in. Crocker cyclotron. The electrical resistance measurements were made at -146°C and other measurements were made at room temperature. The results indicate that the changes in the properties due to irradiation tend to increase in magnitude up to a saturation point. The change in the thermal conductivity due to the damage has also been estimated by calculation. No changes in the metallurgical structure were noticed. (auth)

SPECTROSCOPY

3883 K-1275

Oak Ridge Gaseous Diffusion Plant, Tenn.
INFRARED SPECTRA ANALYSIS FOR HYDROGEN FLUORIDE. D. F. Smith. Apr. 20, 1956. 15p. Contract W-7405-eng-26. \$3.30(ph OTS); \$2.40(mf OTS).

An equation describing the apparent absorption at the peaks of the lines of the HF fundamental band is given for pure HF. This equation has a single parameter which for fixed conditions is a constant. An equation describing the fractional increase in absorption when foreign gas is added is also given. This contains a parameter which is a constant for the foreign gas and the particular line at constant temperature. A table giving this parameter for five lines and twenty different foreign gases at 100°C is presented. These equations are combined so that they may be used for analysis for HF. (auth)

THEORETICAL PHYSICS

Refer to abstract 3801.

URANIUM AND URANIUM COMPOUNDS

3884 ANL-4801

Argonne National Lab., Lemont, Ill.
A SURVEY OF URANIUM METAL-TESTING METHODS. J. L. Hyde. May 1952. Decl. Oct. 26, 1955. 17p. Contract W-31-109-eng-38. \$0.20(OTS).

3885 BMI-753

Battelle Memorial Inst., Columbus, Ohio.
NOTCHED-BAR IMPACT TESTING OF URANIUM. B. J. Paprocki and H. A. Saller. June 26, 1952. Decl. Nov. 30, 1955. 22p. Contract W-7405-eng-92. \$0.20(OTS).

The behavior of uranium metal in notched-bar impact tests is described. The metal was tested over a range of temperatures from -100 to 300°F . Its behavior was comparable with hot-rolled Monel or Inconel. No sharp-transition temperature was noted, and ductile fractures were obtained at all test temperatures. (auth)

3886 BNL-1690

Brookhaven National Lab., Upton, N. Y.
FAST EFFECT MEASUREMENTS. G. Price. [nd]. Decl. Nov. 9, 1955. 8p. Contract AT-30-2-Gen-16. \$0.15(OTS).

A double fission chamber is described for converting fission-product β activities from U^{235} and U^{238} , observed on thin Al catcher foils, to the number of fissions in U^{235} and U^{238} . The β activity of fission fragments per cm^2 from the surface of a thick U foil is compared with the fissions per

gram in a U foil exposed to the same neutron flux. Data from these measurements are included. (K.S.)

3887 ISC-527

Ames Lab., Ames, Iowa.
THE TENSILE PROPERTIES OF URANIUM IN THE INELASTIC RANGE OF STRESS. Robert Wells Lewis and Glenn Murphy. June 1954. 33p. Contract W-7405-eng-82. \$0.30(OTS).

Tensile tests were made on specimens of uranium at strain rates varying from 0.0003 to 0.003 min^{-1} and at temperatures from 25 to 300°C to study the effect of these variables on the strain hardening of the metal. At room temperatures an increase in yield strength of 100% may be induced by a prior loading into the plastic range. Within the limits studied the effect of rate of strain upon strain hardening is negligible. Other factors being equal, the potential strain hardening decreases with an increase in temperature. The data are presented in tables and on graphs. (auth)

3888 KAPL-428

Knolls Atomic Power Lab., Schenectady, N. Y.
FIBER TEXTURES IN URANIUM. Anna M. Turkalo, J. E. Burke, and A. N. Holden. Aug. 21, 1950. Decl. Nov. 17, 1955. 15p. Contract W-31-109-Eng-52. \$0.20(OTS).

The working of U into rods and wires produces a fiber texture in which the grains have a preferred orientation with respect to the bar axis but a random orientation with respect to the perpendiculars to the bar axis. A number of the fiber textures found in U rods have been reported in the classified literature, but a systematic investigation of the factors which affect these textures is lacking. The fiber textures produced in a series of U rods, each of which was swaged at a different temperature from room temperature to 600°C , are presented, and are explained in terms of crystallographic mechanisms of deformation. (auth)

3889 NAA-SR-138

North American Aviation, Inc., Downey, Calif.
INTRA-CELL NEUTRON DENSITIES. PART I. 1 INCH DIAMETER NATURAL URANIUM RODS. A. T. Biehl and D. Woods. Sept. 25, 1951. Decl. Nov. 7, 1955. 39p. Contract AT-11-1-GEN-8. \$0.30(OTS).

Preliminary measurements on the neutron flux distributions in an individual cell in a series of natural U- D_2O lattices are reported. Results indicate that the dip of the thermal neutron is greater than previously expected and that the thermal flux distribution in the D_2O moderator may be explained by simple diffusion theory except for the case of closely packed rods. (C.W.H.)

3890 ORNL-1783

Oak Ridge National Lab., Tenn.
NUCLEAR PROPERTIES OF U^{235} FISSION PRODUCTS. J. O. Blomeke, comp. Nov. 2, 1955. 60p. Contract W-7405-eng-26. \$0.40(OTS).

Tables are presented that list the U^{235} fission-product decay chains and the current best single values of their fission yields and cross sections. The fission products are also tabulated according to decreasing order of half life, thermal-neutron capture cross section, gamma energy, and beta energy. (auth)